

**THE ROLE OF  
DIAGNOSTIC LAPAROSCOPY IN  
NON ACUTE ABDOMINAL CONDITIONS**

**THESIS FOR  
MASTER OF SURGERY  
(GENERAL SURGERY)**



**BUNDELKHAND UNIVERSITY  
JHANSI (U.P.)**

**2004**

**GOPAL PRASAD AGRAWAL**

## ***Dedicated to my Mother***

*(With following lines)*

*My mother is prophetic-  
When she says I will hurt myself, invariably do  
She knows what I am thinking  
She knows my soul.*

*She is also a physician  
She has to hold me once ,to resolve my grieves  
And I keep going back to her  
For that healing touch..*

*She is my protector  
Her lap is like a shelter away from all harm  
I keep close to her  
Because I feel safe.*

*My mother is my beauty queen  
She is plump and she is not so pretty  
But she lights up my life  
The most beautiful woman on earth.*

*She is my best friend-  
Her love is totally unconditional  
She shows me all my faults  
And accepts me as such.*

*My mother is sacred  
She has taught me what religion is all about  
She has taught me to kneel  
She has taught me to pray.*

*She is not here with me-  
Thinking about her and what she means to me  
The rest of the world  
Pales out in comparison.*


## **CERTIFICATE**

This is to certify that the work entitled " **The Role of Diagnostic Laparoscopy in Non-Acute Abdominal Conditions** " which is being presented as a thesis for M.S. (Surgery), by **Dr. Gopal Prasad Agrawal** was conducted in the Department of Surgery M.L.B. Medical College, JHANSI.

The study has been conducted under my direct supervision and guidance. The observations recorded were periodically checked and verified by me. This work fulfils the basic ordinances governing the submission of thesis laid down by Bundelkhand University.

He has put in the necessary stay in the department as per the University regulation.

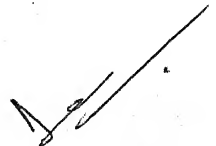
Dated: / /

  
**Dr. R.P. Kala (M.S.)**  
Professor and Head,  
Department of Surgery,  
M.L.B. Medical College,  
Jhansi.

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Dated: / /



**Dr. A.K. Gupta (M.D.)**

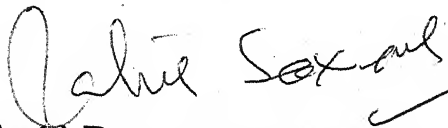
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Dated: / /

  
**Dr. (Smt.) Ratna Saxena (M.D.)**

Associate Professor,  
Department of Pathology,  
M.L.B. Medical College,  
Jhansi.

# **Acknowledgement**

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*Though we thank the Supreme Power daily but I feel deeply blessed when I see my hard work and the blessings of Supreme Almighty and my elders materializing.*

*It is with a deep sense of gratitude that I take this opportunity to express my sincere thanks to my honourable and learned teacher and guide **Dr. R.P.Kala,, (M.S.)** Head of Deptt. of Surgery M.L.B. Medical College, Jhansi. A brilliant Surgeon, dynamic personality and eminent academician. It is my proud privilege to have been associated with and remain under his constant vigilance. The joy and experience of working under his guidance is really something out of this world. His invaluable suggestions, constructive criticisms, meticulous attention to detail and authentic corrections have made this work possible. It is virtually impossible to express in words my deep sense of indebtedness and profound gratitude to him. He will always remain a constant source of inspiration throughout my life.*

*About my Co-Guide **Prof. (Dr.) A.K.Gupta M.D,** Professor and Head, Department of Radiology, M.L.B. Medical College, Jhansi, the more said is less. His affectionate guidance, invaluable support and keen interest have helped me immensely. The constant encouragement and subtle criticism offered by him were the source of strength that enabled me to trod forward over the obstacles*

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*I am indebted to my parents and family members for their inspiration, moral support, love and encouragement throughout my studies, without which I would never have been able to complete thesis work.*

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*I always thanks to **Mr. Praveen Arora (Crux Computers, Sadar Bazar, Jhansi)** who completed the thesis work nicely within time*

*Lastly but not the least I am thankful to all the patients who were the very basis of this study.*

**Dated:**    /    /  
          24/11/03

*Gopal Prasad Agrawal*  
**Gopal Prasad Agrawal.**

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# *Introduction*

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# Introduction

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Laparoscopy is a technique in which the peritoneal cavity and abdominal contents are examined using an endoscope inserted directly through the abdominal wall. Laparoscopy was first used clinically as a diagnostic tool to evaluate abdominal pathology. Ascites of unknown origin and liver disorders were the most common conditions for which diagnostic laparoscopy originally was utilized. Diagnostic laparoscopy has been employed increasingly in the recent years for a wide variety of conditions that include patients with acute and chronic abdominal conditions and abdominal trauma.

Laparoscopy provides a direct and better view of the anatomy of intra-abdominal organs, lesser operative morbidity and mortality, a short hospital stay, acceptability to patients from the point of view of cosmesis and early return to work, all these qualities make laparoscopy superior to conventional exploratory laparotomy as the diagnostic tool. It also allows the surgical team to carry out therapeutic procedure at laparoscopy or indepth proceed to laparotomy saving the patient a repeat visit to O.T., a second anaesthesia etc.

Chronic abdominal pain remains a difficult diagnostic dilemma. History and clinical examinations are usually not contributory, diagnosis is usually delayed and patients undergo exhaustive and costly list of investigations without any relief from their problem, quality of life suffers and chronic abdominal pain becomes a disease itself. Diagnosis and treatment become one of the most challenging and frustrating problems that the clinicians have to face. Clinicians wanders among a long list of causes of non acute abdominal conditions – Adhesions, Koch's abdomen, endometriosis, chronic PID, chronic mesenteric ischemia, chronic pancreatitis, liver cirrhosis, recurrent appendicitis, internal hernias, Teitz syndrome, fibromyalgia, lead poisoning, abdominal wall pains like – iatrogenic peripheral nerve injuries, myofascial pain, rib tip

syndrome, abdominal pain of spinal origin and spontaneous rectus sheath haematoma, numerous psychiatric disorders etc.

In abdominal surgery, it is important to visualize, and/or palpate the problematic area, and to remove tissue sample for histopathological diagnosis. Exploratory laparotomy was the procedure of choice for excision or confirmation of clinical suspicion of a pathologic entity like gastrointestinal malignancy, before laparoscopy, in fact videolaparoscopy became widely available.

Laparoscopy has been used as a diagnostic tool. The recent proliferation of noninvasive surgery has in part rekindled interest in the use of laparoscopy in the preoperative staging of intra-abdominal malignancies. Laparoscopy allows for direct inspection of tumor bed, evaluation of abdominal cavity, including the lesser sac, for contiguous and metastatic spread or lymph node involvement, the gross and the histological study of questionable lesions and achievement of prompt hemostasis. Laparoscopy is able to detect hepatic or peritoneal lesions as small as 1-2 mm in diameter and considering that 40% of liver metastasis are surface lesions, laparoscopy is particularly well suited for preoperative staging purposes. The ability of diagnostic laparoscopy to demonstrate undetected metastasis, thus precluding unnecessary laparatomies has been well documented in pancreatic carcinoma, periampullary carcinoma, esophageal carcinoma, gall bladder carcinoma and gastric carcinoma with more recent experience indicating 20-25% rate of detection of intra-abdominal metastasis in patients with negative results from imaging studies. The concomitant use of other staging modalities, such as laparoscopic ultrasound and peritoneal washings, has further enhanced the diagnostic accuracy of laparoscopy.

In this prospective study we would attempt to evaluate the role of laparoscopy as a diagnostic tool in patients of non acute abdominal conditions in whom the conventional scanning techniques and investigations have failed to clinch the diagnosis.



We also performed a comparative study of efficacy of laparoscopy in diagnosis of non acute abdominal conditions with other available non invasive methods like USG, abdominal X-ray studies. A study was also carried out to compare the accuracy of laparoscopy assisted biopsy with FNAC (blind or USG guided).

In summary, with this technique, the surgeon should be able to assess more accurately the extent of the disease and its histology.

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*Review  
of  
Literature*

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# Review of Literature

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## Histological aspects

The first laparoscopic examination of the abdominal cavity was performed by Kelling in 1901 in a dog<sup>(1)</sup>. Kelling created a pneumoperitoneum by injecting the abdominal cavity with air and inserting a cystoscope through the abdominal wall. Since Kelling was able to view the peritoneal cavity and its contents through the endoscope, he termed this new procedure 'Celioscopy'. In 1911, Jacobaeus performed the first endoscopic examination of abdominal cavity in human and introduced the term "Laparoscopy"<sup>(2)</sup>. In addition, Jacobaeus first described the diagnosis of cirrhosis, metastatic tumors and tuberculosis peritonitis, using the laparoscope. During the next two decades, laparoscope was introduced into the United States by Bernheim. Later Ruddock advocated "peritoneoscopy" and demonstrated improvement in diagnostic accuracy<sup>(4)</sup>. In 1929, Kalk reported the use of a dual trocar technique which allowed simultaneous insertion of operative instruments and improve the diagnostic and therapeutic capabilities of laparoscopy<sup>(3)</sup>. The safety of pneumoperitoneum was improved when Fervers advocated the use of oxygen or carbon dioxide rather than room air in 1930's. Greater safety in the installation of gas was achieved by Veress, who developed a spring loaded needle, that could safely be introduced into the peritoneal cavity in patient with tuberculosis in 1938<sup>(10)</sup>. In 1966, the Hopkins rod system was developed for rigid endoscope that greatly improved image clarity and brightness. In 1960, Kurt Semm, a German gynecologist and engineer contributed the development of an automatic insufflator that precisely controlled gas flow and monitored intra-abdominal pressures during laparoscopy. Semm also performed the first laparoscopic appendectomy in 1983<sup>(5,50)</sup>. In 1987, Phillpe Mouret, in France, performed the first laparoscopic cholecystectomy in human<sup>(55)</sup>.

## Milestones in Laparoscopy

**Bazzani (1805)** first attempt to visualize the interior of a body cavity. He visualized human urethra by candle light and a tube as an endoscope.

**Segalas (1826)** refined the technique of uretheroscopy.

**Desomeaon (1853)** developed first serviceable urethroscope and cystoscope using mirror to reflect light of a kerosene lamp.

**Nietze (1877)** added lens system to the endoscopic tube<sup>(60)</sup>.

**George Kelling (1901)** was first to perform laparoscopy using cystoscope in a dog<sup>(1)</sup>.

**D.O.Ott (1901)**, Russian gynaecologist used ventroscope by using culdoscopy<sup>(41)</sup>.

- ♦ **Jacobaeus (1910)** termed laparoscopy. He performed 1<sup>st</sup> laparoscopic examination of human peritoneal cavity<sup>(2)</sup>.
- ♦ **Nordenloeft (1911)** introduced pneumoperitoneum and trendelenberg's position for visualization of female pelvis.
- ♦ **(1913)** there was widespread use of laparoscopy in Europe and Scandinavia.
- ♦ **Richard Zollikofer (1924)** established CO<sub>2</sub> as the gas of choice for insufflation.
- ♦ **H. Kalk (1929)** wrote "Experience with laparoscopy together with the description of a new instrument." He also presented the role of angled laparoscope in diagnostic laparoscopy<sup>(3)</sup>.
- ♦ **Frevers (1933)** gave the perfect concept of pneumoperitoneum.
- ♦ **Hope USA (1937)** use of laparoscopy in ectopic pregnancy.
- ♦ **Anderson USA (1937)** performed tubal ligation through laparoscope.
- ♦ **Janos Veress (1938)** introduced an obturator needle for pneumoperitoneum known as Veress needle<sup>(10)</sup>.
- ♦ **Donaldson (1942)** performed uterine suspension through laparoscope.
- ♦ **France (1944)** used biopsy forceps through laparoscope.

- ◆ **Fourestier, Gladu and Valmiere (1952)** developed high intensity remote light source.
- ◆ **(1956)** Colour photographs through laparoscope were taken.
- ◆ **Prof. Kurt Semm (1960)** automatic gas insufflator and importance of constant intra abdominal pressure<sup>(5)</sup>.
- ◆ **Neumann and Frick (1960)** invented tentaculum clips across tube for sterilization.
- ◆ **(1964)** First International symposium on laparoscopy held.
- ◆ **Stephae (1967)** 1<sup>st</sup> textbook on laparoscopy.
- ◆ **(1970)** New era of modern laparoscopy after development of Quartz Light.
- ◆ **Dekok (1977)** laparoscopic assisted appendectomy.
- ◆ **(1977)** laparoscopy in general surgery was first used for liver biopsy under direct vision.
- ◆ **Warshaw (1986)** used laparoscopy for staging of pancreatic cancer.
- ◆ **Mouret (1987)** performed first laparoscopic cholecystectomy.
- ◆ **(1990 – 2002)** widespread use of different laparoscopic procedures. Evolving techniques are digital surgery and telerobotic surgery.

Year	Investigator	Contribution
1901	Kelling	1 <sup>st</sup> laparoscopic examination of the abdominal cavity
1911	Jacobaeus	1 <sup>st</sup> laparoscopic examination in humans
1929	Kalk	Dual trocar technique
1938	Veress	Spring loaded obturator needle for pneumoperitoneum
1966	Hopkins	Development of rod lens optical system
1960's	Semm	Development of automatic CO <sub>2</sub> insufflator and numerous laparoscopic instruments
Early 1980's	---	Development of miniature TV camera chips
1987	Mouret	1 <sup>st</sup> laparoscopic cholecystectomy

## THE ROLE OF DIAGNOSTIC LAPAROSCOPY IN NON-ACUTE ABDOMINAL CONDITIONS

Klingensmith ME et al (1996) in their retrospective study suggested that laparoscopy can identify abdominal pathology and improve outcome in a majority of selected cases<sup>(24)</sup>.

Schiotroma M. et al, (1996) found laparoscopy is an effective tool for the evaluation of the patients with chronic abdominal pain and laparoscopic adhesiolysis cures or ameliorates chronic abdominal pain in more than 80% of patients<sup>(23)</sup>.

Bronstein JA et al (1996) concluded in their study that difficulty and delay in diagnosis of abdominal tuberculosis can be minimized by laparoscopic or laparotomy biopsy. It is found far better than mantoux test or culture of ascitic fluid<sup>(30)</sup>.

Miller K et al (1996) reported that laparoscopy provided diagnosis on 53 of 59 patients (89.8%). 5 out of 59 patients (8.5%) revealed no improvement of pain post-operatively and 6 out of 59 (10.7%) still suffer from pain at the time of the follow up<sup>(25)</sup>.

Yu Sy et al (1997) reported that diagnostic laparoscopy benefits patients by avoiding unnecessary surgery, avoiding unnecessary delay in diagnosis and treatment and shortening the operative and hospitalized period. However, it provides only an alternative, not a substitute for traditional diagnostic procedures and never lessens the importance of conventional laparotomy<sup>(21)</sup>.

Chas K. et al (1997) found diagnostic laparoscopy worthwhile for patients with right iliacfossa pain. Concurrent appendectomy should be considered in young patients with episodic, well localized symptoms associated with systemic malaise while adhesiolysis may be beneficial for visceroparietal adhesion beneath abdominal wall scar<sup>(22)</sup>.

Bauma BJ. Et al (1997) reported that abdominal tuberculosis is often diagnosed in a late stage because symptoms are aspecific. Two

patients with intestinal tuberculosis and tuberculosis peritonitis respectively, both from endemic countries presented with long standing fever, abdominal pain and weight loss. Acid fast bacilli were present in aspirate and biopsy specimens obtained by colonoscopy and laparoscopy respectively. PCR was positive for *M. tuberculosis* complex and later *M. tuberculosis* was cultured. Both patients responded to anti-tubercular therapy<sup>(32)</sup>.

**Molanghlin S. et al (1998)** documented three diagnosed cases of abdominal tuberculosis over 12 months period in Melbourne Western Suburbs teaching hospital, which services a large migrant population. If migrants present with diffuse abdominal symptoms, the diagnosis of abdominal tuberculosis should always be considered. Laparoscopy should replace diagnostic laparotomy as a definitive diagnostic tool<sup>(31)</sup>.

**Levonius et al (1999)** concluded from his retrospective study that laparoscopy is a safe and useful procedure in the diagnosis and treatment of chronic abdominal pain. He found adhesiolysis good or beneficial in his seventy seven percent of patients. Sixty percent of all patients reported a beneficial outcome after laparoscopy<sup>(20)</sup>.

**Stringel C. et al (1999)** reported that diagnostic laparoscopy is a valuable procedure in the management of children with chronic recurrent abdominal pain. Based on their experience they recommended diagnostic laparoscopy early in the course of debilitating chronic abdominal pain in children. Appendectomy should be done when no other significant cause of abdominal pain has been identified even if appendix looks normal<sup>(19)</sup>.

**Lam KN. Et al (1999)** has found that laparoscopic examination of the abdominal contents and the peritoneum is an effective way to obtain a conclusive diagnosis of abdominal tuberculosis<sup>(29)</sup>.

**Tison et al (2000)** reported a case of 21 years old women suffering from abdominal pain and fever of 39 degrees, was hospitalized. Ultrasonography and CT-scan showed a large amount of ascitic fluid and one hepatic node. The serum Ca 125 level was



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elevated. PCR searching tuberculosis antigen in ascitic fluid was normal. A diagnosis of peritoneal tuberculosis was supposed and exploratory laparoscopy was done. Peroperative observation of the ascites with multiple sites of adhesion and pathological examination of hepatic nodule and peritoneum confirmed initial diagnosis. ATT was given for one year. A second laparoscopic procedure was performed and found no disease remaining<sup>(33)</sup>.

**Bromors AJ et al (2000)** reported that laparoscopic adhesiolysis has not yet passed the stage of clinical trial and requires objective evaluation, including detailed information on recurrence and de novo adhesions in correlation with clinical outcome<sup>(17)</sup>.

**Wipfli-Funke A. et al**, reported his study of 154 patients, who were operated because of chronic abdominal pain, in the lower abdomen 27(17.5%), suspicion of adhesion 43(27.9%), of an adnexal tumor 56(33.8%), of endometriosis 5(3.2%), sterility 11(10%) or irreversible contraception 16(7.2%). 112 patients had to be laparotomized once or several times, 105 women had only adhesion, 22 women had adhesion and endometriosis. In the last group there was the greatest number of laparotomies. 95 patients answered the questionnaires six months later. 35(36.8%) were free from pain, 18(13.3%) states a clear improvement, 38(40%) were temporarily free from pain and 9(8.2%) stated unchanged pain. One woman complained postoperatively about clear aggravation of pain<sup>(35)</sup>.

## **BASIC PRINCIPLES OF LAPAROSCOPY**

### **Indications**

Laparoscopy (peritoneoscopy) is a procedure, which allows direct examination of large portions of the surface area of the liver, gallbladder, spleen, peritoneum and pelvic organs. The addition of direct biopsy increases diagnostic accuracy. Laparoscopy is simple, safe and well tolerated under local anesthesia. General anesthesia is

neither necessary nor desirable, except in special circumstances. While sterile conditions are required, laparoscopy need not be performed in an operating room, also routine backup by a surgical or anesthesia team is usually not required. The procedure may be performed on an outpatient basis, although more commonly it is an inpatient procedure. Despite the advent of newer imaging techniques (e.g. computerized tomography, ultrasonography, magnetic resonance imaging), with fine needle biopsy capability, laparoscopy remains a valuable tool when appropriately applied in a thoughtful diagnostic plan. In the final analysis, local experience and results will determine the preference for each of these diagnostic modalities.

Although diagnostic laparoscopy has an associated mortality and morbidity, problems can be limited by careful selection of patients. Several studies have documented adverse cardiopulmonary effects of pneumoperitoneum<sup>(39)</sup> and therefore, it is important to carefully screen patients who have underlying pulmonary and cardiac disease. Since many older patients with potential neoplasm's have associated chronic obstructive pulmonary disease and coronary artery disease a full work-up including appropriate laboratory and imaging studies should be done prior to diagnostic laparoscopy. Similarly laboratory evaluation for coagulation defects is extremely important. It is also important to assess the platelet count preoperatively and to achieve platelet levels of at least 20,000 to 30,000 per mm<sup>3</sup> prior to diagnostic laparoscopy<sup>(16)</sup>.

While the determination of the etiology of ascites is usually straightforward by history, physical examination, and analysis of ascitic fluid, the diagnosis of tuberculous or carcinomatous ascites may be elusive. In such cases, laparoscopy with biopsy is highly accurate.

Blind percutaneous liver biopsy is often used to confirm the diagnosis of cirrhosis. When this approach yields inconclusive results, laparoscopy should be considered. Since percutaneous liver biopsy may be more difficult and hazardous in patients with small livers or in those with large volume ascites, laparoscopy is preferable to blind

biopsy. While it is believed that laparoscopic guided liver biopsy is safer in cirrhotic patients with borderline coagulation defects, this point has not been verified<sup>(9)</sup>.

The surgeon endoscopist who undertakes laparoscopic examination should also have available accessories needed for biopsy or cytologic studies. Acquaintance with two or three approaches will also be helpful, depending on the information to be obtained. A percutaneous core biopsy needles should be available if directed biopsy is anticipated. The primary accessory instruments required for diagnostic laparoscopy are non-crushing biopsy forceps, atraumatic graspers for manipulation of bowel and omentum, intra-abdominal retractors for lifting hepatic lobes or if the retrogastric area is entered, the stomach and the usual array of equipment for controlling bleeding resulting from biopsy. It is also important to position the feet at 90° angle on a foot board to avoid neurologic injury during prolonged laparoscopic examination.

Although abdominal assessment for cancer may be achieved without laparoscopy, this technique will be helpful when studies have been unrevealing or equivocal. Patients with unexplained ascites, abdominal pain, weight loss, or palpable masses would be better treated with early laparoscopy and directed biopsies than with multiple scans and blind biopsies.

Laparoscopy may be useful in the evaluation of suspected hepatic malignancy either primary or metastatic<sup>(63)</sup>. Eighty to ninety percent of these lesions are present on the hepatic surface and upto 2/3<sup>rd</sup> of liver surface may be inspected. Blind percutaneous liver biopsy or image-guided needle aspirate biopsy is frequently employed as the initial diagnostic modality for suspected hepatic malignancy. Laparoscopy is appropriate when hepatic tumor is suspected but not proven by percutaneous biopsy techniques. Laparoscopy is also useful in detecting small (less than 2 cm) neoplasm's not seen by imaging modalities. When laparoscopy is utilized in the diagnosis and staging of

lymphoma and pancreatic or esophageal cancer, exploratory laparotomy may be averted in a significant percentage of cases.

### **Contraindications to Laparoscopic Surgery**

#### **Absolute contraindications**

1. Uncorrectable coagulopathy.
2. "Frozen" abdomen from adhesions.
3. Intestinal obstruction with massive abdominal distension.
4. Hemorrhagic shock.
5. Severe cardiac dysfunction.
6. Concomitant disease requiring laparotomy.

#### **Relative contraindications**

1. Abdominal sepsis/peritonitis.
2. Pregnancy.
3. Morbid obesity.
4. Multiple previous abdominal operations.
5. Severe chronic obstructive pulmonary disease.

Pregnancy once was considered as absolute contraindication to laparoscopy because of the unknown effects of CO<sub>2</sub> pneumoperitoneum on the fetus. However several reports have demonstrated successful laparoscopic cholecystectomy in patients with severe biliary symptoms during the second trimester of pregnancy, without untoward effects in either the fetus or mother<sup>(45)</sup>.

The management of patients with severe COPD remains problematic. In some case, it may be possible to carry out the procedure under regional or local anesthesia. However the increased diaphragmatic pressure and CO<sub>2</sub> absorption from the pneumoperitoneum and intravenous sedation required may further compromise the pulmonary condition of the patient. However, the

advantage of a minimally invasive approach in such patients is that there is less impairment of post-operative pulmonary function than there is with conventional open surgery<sup>(37, 43, 44)</sup>.

If tense ascites is present, large volume paracentesis can be performed as the preliminary step in the laparoscopy. Previous laparotomy incisions may necessitate alteration of the usual trocar insertion site, or may represent a contraindication to the procedure<sup>(48)</sup>.

Laparoscopy is typically performed under general anesthesia, and thus exposes patients to certain risk. Staging laparoscopy can also be performed under local anesthesia with conscious sedation<sup>(38)</sup>. This approach avoids the risk and exposure of general anesthesia but limits extensive manipulation, particularly blunt dissection into the lesser sac and the use of laparoscopic ultrasound (LUS), due to potential discomfort to the patient.

Monitoring during laparoscopy should include electrocardiographic monitoring, end tidal CO<sub>2</sub> monitoring, blood pressure evaluation using either a cuff or an indwelling arterial line, and a bladder catheter that allows the urine output to be evaluated and decompression of the bladder for trocar insertion. A nasogastric tube should be routinely passed, in order to facilitate gastric emptying during the procedure<sup>(36)</sup>.

## LAPAROSCOPIC COMPLICATIONS

### Pneumoperitoneum Related Complications

1. CO<sub>2</sub> embolism.
2. Hypercarbia.
3. Respiratory acidosis.
4. Subcutaneous emphysema.
5. Pneumothorax.
6. Pneumomediastinum.
7. Transient dysarrhythmias

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### **Insertion Related Complications**

1. Major vascular injury.
2. Gastrointestinal injury.
3. Bladder injury.
4. CO<sub>2</sub> embolism.
5. Abdominal wall hemorrhage.

### **Post-insertional Complications**

1. Gastrointestinal perforation (acute or delayed).
2. Laceration/bleeding from solid organs (liver, spleen, kidney).
3. Hernias of abdominal wall.

In most reported series, complications are minor and occur with a frequency of 1.5 % and mortality rate is approximately 0.05%.

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*Material*  
*&*  
*Methods*

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# Material & Methods

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The present study was conducted on patients who were admitted in department of Surgery at M.L.B. Medical College, Jhansi in the last sixteen months.

We included all possible cases in our study, of different non acute abdominal conditions e.g. subacute intestinal obstruction (SAIO), adhesions, Koch's abdomen, Liver cirrhosis, Endometriosis, chronic PID, chronic pancreatitis, abdominal malignancies, gall bladder carcinoma, gastric carcinoma, colorectal carcinoma etc.

The patients were assessed prior to diagnostic laparoscopy by detailed history including age, sex, occupation, socioeconomic status, total duration of illness, any treatment received was taken.

**Investigations :** Following investigations were performed

1. Hemogram – Hb, TLC, DLC, ESR etc.
2. Urine examination – Urine routine and microscopic examination
3. Blood Sugar
4. Blood Urea
5. Serum Creatinine
6. PT /PC
7. Liver Function Test
8. Serum electrolytes – S.Sodium, S.Potassium
9. ECG especially in patients above 50 years
10. Plain X-ray abdomen AP view with both domes of diaphragm
11. X-ray chest – PA view in patients having abnormal sounds on auscultation of chest
12. Special investigation : USG, Barium meal etc.

A physical examination to assess the general condition, P/R, BP, temperature, pallor, icterus, edema, cyanosis and clubbing. Important points in physical examination included search for any significant lymphadenopathy, hepatosplenomegaly, ascites, presence of any other



abdominal lump, oedema of limbs, pain if any (its site and radiation), with systemic examination to rule out any cardiac or respiratory abnormality or any CNS pathology were carried out.

The patients found fit, were subjected to diagnostic laparoscopy in the department and the findings were noted. The results were compared with various currently available investigative procedures like USG, abdomen X-ray studies or FNAC to find out diagnostic laparoscopy an effective method for diagnosing non-acute abdominal conditions in Indian setup.

**The role of laparoscopy was evaluated as following : -**

- ❖ To diagnose the cause of non-acute abdominal conditions in these patients.
- ❖ To compare the merits and demerits of laparoscopy along with Ultrasonography, C.T. Scan and conventional laparotomy.

## **Methods**

### **Technique of laparoscopy**

#### ***Preparation of patient***

The patient is fully investigated for liver functions and bleeding diathesis. Important investigations include a complete blood count, platelet count, prothrombin time, X-ray chest and EKG. If massive ascites is present the fluid is aspirated a day prior to the procedure so as to prevent shock due to a sudden release of intra-abdominal pressure.

The patient should be fasted for 12 hours before the procedure. Not only does this lessen the risk of vomiting and aspiration during the technique, but it also allows a general anesthesia to be given, should this become necessary for the management of complications.

The prothrombin time must be checked and if abdominal, suitable therapy must be advised. A prolongation of upto 10 seconds in the

patient can be accepted, but beyond 10 seconds the risk of hemorrhage is considered to be great. However, if the patient is more than 3 seconds prolonged, a liver biopsy cannot be performed at the time of laparoscopy. The abdominal wall should be shaved if the patient is unusually hirsute.

Usually the laparoscopic procedures are done under GA but local or epidural anesthesia can be given.

Ryle's tube should be put to decompress stomach and Foley's catheter to evacuate bladder as these organs may be damaged during procedure.

### ***Position***

Position of patient depends on the area of abdominal cavity to be examined. For upper abdominal cavity usual supine position is good. Examination of pelvic cavity is done in trendelenburg's (head end 30° low) position ; for spleen supine, head end up with right-sided tilt. These positions displace the other organs like small bowel, transverse colon etc.

### ***Site of Incision***

The anterior wall is cleaned with Savlon, Alcohol, and Betadine. After sterile drapping the site of incision is decided. Usually in patients with an intact abdomen linea alba just superior to umbilicus is the puncture site of choice. It may be 2-3 cm below or above umbilicus. In patients with suspected adhesions and scars of previous surgery left hypochondrium is the site of choice. The areas overlying solid abdominal viscera, masses, old scars and abdominal wall veins should be avoided.

An adequate incision of 1 to 1.5 cm is made through the skin, subcutaneous tissue and anterior fascia.

### ***Pneumoperitoneum***

Pneumoperitoneum needle (Veress needle) is inserted through the dissected area down to the level of fascia. The direction of needle should be parallel to abdominal wall and towards pelvis to avoid bowel

and major vascular injury. Abdominal wall should be elevated anteriorly by assistant. Steady pressure is applied to the needle so that the tip perforates the fascia and parietal peritoneum with a sound of "PLOP". A syringe filled with saline is attached to Veress needle and first aspirated to make sure that the needle has not entered a blood vessel or the lumen of the intestine. Then saline is pushed gently. If the needle is in the peritoneal cavity the saline-air level will go down with gravity. Now insufflation of CO<sub>2</sub> is started. In local anesthesia NO<sub>2</sub> may be used due to its analgesic action as CO<sub>2</sub> causes some peritoneal irritation.

The insufflation should be done slowly to avoid reflex vagal stimulation due to sudden stretching of peritoneum. The volume of CO<sub>2</sub> required for an adequate pneumoperitoneum (12-14 mm Hg) is on an average about 2 to 3 liters. Patient is closely monitored. If the patient develops arrhythmia's during insufflation it is stopped till arrhythmia is corrected.

#### ***Insertion of trocar and cannula***

Diagnostic laparoscopy usually is carried out with a 5 mm or 10 mm trocar placed at the umbilicus.

The cannula with its trocar is introduced through the incision into the free peritoneal space. The small stab incision is slightly enlarged to provide tight fit around the examining trocar. The trocar is introduced with a drilling – pressing motion (circular back and forth rotatory movements). A hissing noise through the hollow stylet indicates that the higher pressure zone has been entered. Once it is in peritoneal cavity the trocar is removed. The trumpet valve on cannula (sleeve) prevents CO<sub>2</sub> leakage. Telescope is then passed through the cannula.

A second trocar (5 mm for manipulation, biopsy suction coagulation cannula, etc) is introduced under visual control just lateral to rectus muscle, inferior to right costal margin. Finger indentation on anterior abdominal wall helps to decide this site.

### **Examination and operative maneuvers**

Systemic exploration of all four quadrants of abdomen to confirm or exclude a diagnosis is must. Exploration is done carefully, very often the procedure is difficult because of the distended loops of bowel or adhesions.

In case of ascites, it is aspirated and sent for bacteriological culture and pathology.

1. Exploration with laparoscopy begins in the right lower quadrant. The caecum and appendix are examined. Small bowel from ileocecal junction to duodenojejunal flexure is carefully inspected loop by loop. Appendicitis, Meckel's diverticulitis, tuberculosis of ileum, enteritis, bands, mesenteric lymph nodes are searched for.
2. If no pathology in small bowel inspection through laparoscope is found, pelvic examination in trendelenburg's position is done for any uterine, tubal and ovarian endometriosis, adhesions, cysts and tumors etc.
3. Large bowel examination – rectum – sigmoid – descending colon – splenic flexure – transverse colon – hepatic flexure – ascending colon – caecum in order to exclude pathologies like amoebiasis, tuberculosis, tumors etc.

Paracolic gutters and pelvis can be better visualized with laparoscopy than laparotomy.

4. Supracolic compartment
  - (a) Liver : Note about size of the lobes, appearance of liver surface, colour, texture, nodularity and consistency. About 2/3<sup>rd</sup> of liver surface can be examined. Under surface of the diaphragm can be better visualized with laparoscopy than laparotomy.
  - (b) Gall bladder : Size, appearance, adhesions etc.
  - (c) Hepatoduodenal ligament, pylorus, proximal duodenum, anterior surface of stomach, both sides of falciform ligament.

- (d) Parietal peritoneum : For dilated veins (portal hypertension), adhesions, small whitish nodules (1-3 mm) – take a biopsy, it may be metastatic carcinoma, tubercles, mesothelioma.
- (e) Spleen : No biopsy should be tried.
- (f) Pancreas : For pancreatitis.
- (g) Root of mesocolon at the site of ligament of treitz : edema / hemorrhage discolouration indicate acute pancreatitis.
- (h) Lesser sac : For gastric ulcer or pancreatitis.

### **Biopsy**

Biopsy is taken through second cannula by a biopsy forcep, whenever indicated. Viewing through the laparoscope a guided “biopsy under direct vision” is taken. Before taking any biopsy from liver the site is palpated. If the lesion is cystic and bluish in appearance – no biopsy should be tried as it may be hemangioma or cavernous malformation leading to hemorrhage. Spleen should never be biopsied.

After taking biopsy the traumatized tissue is burnt with diathermy and direct inspection of the area is done to ensure that there is no further bleeding from the biopsy site.

### **Termination of the procedure**

At the end, areas of manipulation are scanned once again to see for any evidence of injury. The abdomen is desufflated and incisions are closed with sutures (vicryl) / clips. Port site hernias are more common when fascial opening is more than 10 mm.

### **INSTRUMENTS USED DURING PROCEDURE ARE : -**

#### **(A) Insufflation and optical equipment**

- (1) **A Veress Needle** : Used for the initial creation of the pneumoperitoneum.
- (2) **Cannula** : It is a tube of fixed internal diameter through which instruments are introduced into peritoneal cavity. Internal

diameter may be [5-6 mm (small) or 10-12 mm (larger)]. There is some sort of valve mechanism (trumpet) to prevent inadvertent escape of CO<sub>2</sub>. These may be with or without a lockable side port for CO<sub>2</sub> insufflation

- (3) **Trocars** : The trocar passes through the cannula centre providing a sharp point to facilitate passage of trocar (and cannula assembly) through the abdominal wall.
- (4) **Laparoscope** : 0° view and 10 mm diameter, with 5 mm light guide cable 20°-40° angled laparoscopes may be needed during adhesiolysis.
- (5) **Video System** : It comprises of camera – attached over the laparoscope eye piece single CCD chip 530 lines with PAL – B/G and 150 W.
- (6) **Light Source** : High intensity (175 W) light source – Xenon automatic.
- (7) **Television Monitor** : High resolution monitor 14" resolution > 600 lines of horizontal resolution PAL –B/G.
- (8) **Insufflator** : The insufflator is the machine, which pumps the gas into the peritoneal cavity at a precise pressure and rate (30 ml/minute). CO<sub>2</sub> is the gas of choice for insufflation. Initially 1 - 1.2 L/minute and in high flow 15 L/minute is given under vision with auto heating and capable of blow back with bacterial filter (0.3 micron). For laparoscopic surgery the intraperitoneal pressure is between 12 – 15 mm Hg, which represents a volume of 2.5 – 4 litres in the relaxed peritoneal cavity.

## **(B) Hand instruments**

### **(a) Coagulating instruments : Probe**

- (1) Diathermy Hook (with or without irrigation part)
- (2) Diathermy spatula
- (3) Diathermy bulb/button probe for deep contact or spray with monopolar.



- (b) Scissors
- (c) Holding forceps – graspers for bowel
- (d) Dissecting instruments
- (e) Suction / irrigation devices
- (f) Trucut biopsy needle
- (g) Two 5 mm manipulator ports in flanks.

## STERILIZATION OF INSTRUMENTS

Guidelines by the Association of Operating Room Nurses in the USA are :

- (1) Meticulous care should be taken in mechanically cleansing all parts of laparoscopic equipment.
- (2) Either high level disinfection / sterilization is an accepting method of preparing instruments.
- (3) Chemical germicides capable of killing all micro-organism (Glutaraldehyde).
- (4) Aseptic technique should be used in transferring the disinfected / sterilized endoscopic and other instruments to the sterile surgical field.
- (5) In the presence of increased risk of infection because of compromised immune systems sterilization is required and not only high level disinfection.

No admission to the described protocol necessary to deal with HIV or Hepatitis B contaminated instruments.

## HIGH LEVEL DISINFECTION

- (1) Ethylene oxide gas – It produces sterile instruments only after 10 hours of exposure. It can cause instrument damage. It is not feasible in high turnover setups.
- (2) Glutaraldehyde (Cidex solution) – It is most popular agent for laparoscopic / endoscopic instruments. 20 minutes incubation in 20% solution is required. Solution once prepared is

accepted for maximum of 14 days. Well suited for high turnover setup. Disadvantages of glutaraldehyde are – contact dermatitis, rhinitis, asthma, eye irritation. So thorough wash with normal saline is must before use of instruments.



# Working Proforma

## TOPIC : The Role of Diagnostic Laparoscopy in Non-Acute Abdominal Conditions

*Patient Name :*

*Age / Sex :*

*Ward / Bed :*

*Address :*

*Date of Admission :*

*Date of Discharge :*

*Date of Diagnostic Laparoscopy :*

*Pre-laparoscopic Diagnosis :*

*Post-laparoscopic Diagnosis :*

*Operative time :*

*Complications :*

*Preoperative :*

*Postoperative :*

*Any / Specific investigations :*

*X-ray abdomen, USG, FNAC, Biopsy*

*Presenting Complaints :*

# **Aims of Study**

The following are the aims of the study :

1. To ascertain the role of laparoscopy as a diagnostic tool in non acute abdominal conditions in a developing country like India.
2. To compare the efficacy of laparoscopy in diagnosing non-acute abdominal conditions with other available non-invasive methods like USG, abdominal X-ray studies.
3. To obtain tissue for histopathological diagnosis and compare the accuracy of laparoscopy assisted biopsy with FNAC (blind or USG guided).

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# *Observations*

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# Observations

The present study has been undertaken at M.L.B. Medical College, Jhansi over a period of sixteen months. During this period, 12 cases of non-acute abdominal conditions were taken in the study (n=12). Attempt has been made to include all cases admitted to the department, however, few cases could not be included because of incompleteness of study, due to unavoidable reasons.

Age & Sex distribution of total cases is shown in Table 1 & Table 2.

**Table 1. Sex distribution of cases.**

Sex	Number of cases	Percentage (%)
Males	2	16.7%
Females	10	83.3%
Total	12	100%

Ten out of twelve patients were female (83.3%), while two patients (16.7%) were male. Male : female ratio = 1:5.

**Table 2. Characteristics of Age Distribution.**

Age range (yrs)	Number of patients	Percentage (%)	Mean age
0 – 10	3	25%	22.75
11 – 20	3	25%	
21 – 30	3	25%	
31 – 40	2	16.7%	
41 – 50	0	0	
51 – 60	1	8.3%	
> 60	0	0	

Most patients in this study belonged to the age group between 0 – 40 years. Mean age of patients was 22.75 years, youngest was of 6 years and oldest 60 years..

**Table 3. History of previous abdominal surgery in study group.**

Characteristics	No. of patients	Percentage (%)
History of previous abdominal surgery	1	8.3%
No history of previous abdominal surgery	11	91.7%
Total	12	100%

Out of 12 patients 1 patient (8.3%) had history of previous abdominal surgery like appendectomy, etc. But 11 out of 12 patients (91.7%) had no history of previous abdominal surgery.

**Table 4. The common symptoms among the study group.**

Symptoms	No. of cases	Percentage (%)
Chronic Pain abdomen	11	91.3%
Lump abdomen	2	16.7%
Distention of abdomen	3	25%
Mobile abdominal lump	4	33.3%
Weight loss	5	41.7%
Loss of appetite	6	50%
Jaundice	1	8.3%
Fever	2	16.7%
Nausea / Vomiting	9	75%
Altered bowel habits	3	25%
Paucity of flatus	6	50%
Bleeding per rectum	0	0

The commonest symptom was pain in abdomen which was found in 11 out of 12 patients (91.3%). Other common symptoms include nausea / vomiting (9 patients, 75%), loss of appetite (6 patients, 50%), paucity of flatus (6 patients, 50%), weight loss (5 patients, 41.7%), mobile abdomen lump (4 patients, 33.3%), distention of abdomen and altered bowel habits each was present in 3 patients (25%) and other

non-common symptoms include lump in abdomen (16.7%), fever (16.7%), jaundice (8.3%).

**Table 5. Findings on physical examination of patients in study group.**

Findings	No. of patients	Percentage (%)
Per abdominal examination within normal limits	7	58.3%
Anemia	6	50%
Lymphadenopathy	2	16.7%
Ascites	2	16.7%
Visible pulsation	2	16.7%
Tenderness on P/A	5	41.7%
Hepatomegaly	2	16.7%
Splenomegaly	1	8.3%
Lump in abdomen	2	16.7%

7 out of 12 patients (58.3%) had no per-abdomen findings. Anemia was clinically detectable in 6 patients (50%). During P/A examination tenderness was present in 5 patients (41.7%). Ascites was detected clinically in 2 out of 12 patients (16.7%) and visible pulsation, lymphadenopathy, lump in abdomen and hepatomegaly was found in 2 out of 12 patients (16.7%) each. Splenomegaly was found in 1 out of 12 patients (8.3%).

## ULTRASOUND AND X-RAY ABDOMEN

In this series ultrasound was the most frequently performed scanning investigations. All 12 patients underwent ultrasonographic examination of abdomen (100%).

non-common symptoms include lump in abdomen (16.7%), fever (16.7%), jaundice (8.3%).

**Table 5. Findings on physical examination of patients in study group.**

Findings	No. of patients	Percentage (%)
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Visible pulsation	2	16.7%
Tenderness on P/A	5	41.7%
Hepatomegaly	2	16.7%
Splenomegaly	1	8.3%
Lump in abdomen	2	16.7%

7 out of 12 patients (58.3%) had no per-abdomen findings. Anemia was clinically detectable in 6 patients (50%). During P/A examination tenderness was present in 5 patients (41.7%). Ascites was detected clinically in 2 out of 12 patients (16.7%) and visible pulsation, lymphadenopathy, lump in abdomen and hepatomegaly was found in 2 out of 12 patients (16.7%) each. Splenomegaly was found in 1 out of 12 patients (8.3%).

#### **ULTRASOUND AND X-RAY ABDOMEN**

In this series ultrasound was the most frequently performed scanning investigations. All 12 patients underwent ultrasonographic examination of abdomen (100%).

**Table 6. Characteristics of Imaging technique.**

Scanning	Number of patients	Percentage (%)
Ultrasound	12	100%
X-ray abdomen	3	25%

In 3 out of 12 patients (25%) X-ray abdomen was also done.

**Table 7. USG and X-ray abdomen reports of patients.**

S.No	USG Assessment	X-ray abdomen
1.	Normal ultrasonographic study	Normal
2.	Normal ultrasonographic study	-
3.	Normal ultrasonographic study	-
4.	Normal ultrasonographic study	-
5.	Distended small bowel loops, rest within normal limits	Normal
6.	Ascites, hepatosplenomegaly, abdominal lymph nodes.	-
7.	Ascites with Gall-bladder carcinoma with liver secondaries	-
8.	Normal ultrasonographic study	-
9.	Distended small bowel loops	-
10.	Normal ultrasonographic study	-
11.	Normal ultrasonographic study	-
12.	Distended small bowel loops, thickened bowel in ileocecal region	Dilated bowel loops

In 2 patients out of 12 patients (16.7%) ultrasonography detected ascites. Distended bowel loops were reported in 3 patients out of 12 patients (25%). In rest of the 7 patients (58.7%) ultrasonographic findings were in normal limits or inconclusive. In 3 patients out of 12 patients (25%) X-ray abdomen was done. It supported ultrasonographic finding in one (8.3%) patient.



In 2 out of 12 patients hepatomegaly was present (16.7%), in 1 patient out of 12 patients Gall-bladder carcinoma was present (8.7%).

## LAPAROSCOPIC EVALUATION

**Table 8. Characteristics among types of Anesthesia.**

Anesthesia	Number of patients	Percentage (%)
General Anesthesia	7	58.3%
Local Anesthesia	5	41.7%
Total	12	100%

In 5 out of 12 patients (41.7%) diagnostic laparoscopy was performed under local anesthesia, and in 7 out of 12 patients (68.3%) under general anesthesia. So general anesthesia was the most preferred anesthesia.

## LAPAROSCOPIC FINDINGS

**Table 9. Ascites.**

Ascites	Number of cases	Percentage (%)
Present	3	25%
Absent	9	75%
Total	12	100%

Out of 12 patients who underwent diagnostic laparoscopy, ascites was found in 3 patients (25%). Ultrasonography detected ascites in only 2 of these patients (16.7%).

**Table 10. Presence of lump.**

Lump (GB, ICT-lump)	No of cases	Percentage (%)
Present	2	16.7%
Absent	10	83.3%
Total	12	100%

(GB : Gall-bladder, ICT : ileocecal tuberculosis)

Of 12 patients who underwent diagnostic laparoscopy, lump was found in 2 patients (16.7%).

**Table 11. Adhesions.**

Adhesions	Number of cases (n)	Percentage (%)
Present	7	58.3%
Absent	5	41.7%
Total	12	100%

Of 12 patients who underwent diagnostic laparoscopy, adhesions were found in 7 patients (58.3%).

**Table 12. Lymph node involvement.**

Lymph Node involvement	No. of cases	Percentage (%)
Present	3	25%
Absent	9	75%
Total	12	100%

Of 12 patients who underwent diagnostic laparoscopy, involvement of lymph nodes was found in 3 patients (25%), and biopsy was done for histopathological examination and confirmation in 2 out of 12 patients (16.7%).

**Table 13. Bands and strictures, Tubercles and peritoneum adhesions.**

Laparoscopic findings	No. of patients	Percentage (%)
Bands	3	25%
Strictures	1	8.3%
Tubercles	4	33.3%
Peritoneum adhesions	4	33.3%

In 4 out of 12 patients (33.3%) tubercles was detected on bowels and peritoneal surface. Bands was found in 3 out of 12 patients (25%), and peritoneal adhesions with bowels was found in 4 out of 12 patients (33.3%), strictures were present (8.3%).

**Table 14. Characteristics of bowel on laparoscopy.**

Laparoscopic findings	Number of patients	Percentage
Hypertrophic bowel	3	25%
Hyperaemic bowel	2	16.7%
Distended bowel segment	4	33.3%
Adhered omentum on bowel	5	41.7%
Normal	3	25%

In 3 out of 12 patients bowel was normal (25%). Hypertrophic bowel was present in 3 patients (25%). Hyperaemia in 2 patient (16.7%) and mean distended bowel segments in 4 patients (33.3%). Mesentery was almost normal in 10 patients, 2 patients had mesenteric lymphadenopathy (16.7%).

Mean operating time was 23 minutes.

Average post-operative stay was 3.3 days.

No operative or post-operative complication occurred in any of the 12 patients who underwent diagnostic laparoscopy.

There was no mortality and no conversion to laparotomy in any patient.

#### Biopsies / FNAC

Laparoscopic guided biopsy under direct vision was taken whenever possible to provide confirmation of laparoscopic findings. Of the 12 patients who underwent diagnostic laparoscopy biopsy was taken in 2 (16.7%) patients.

**Table 15. Biopsy Report.**

Biopsy Report	No. of cases	Percentage
Confirmatory	2	100%
Inconclusive	0	0
Total	2	100%

Of the 2 biopsies taken under direct vision at laparoscopy, both were found confirmatory (100%).

In 1 patient, laparoscopic guided biopsy (NHL) report deferred from FNAC report of same patient (Non malignant cells).

### LAPAROSCOPIC FINDINGS COMPARISON WITH ULTRASONOGRAPHY AND X-RAY ABDOMEN.

**Table 16. Characteristics of laparoscopy Vs. Ultrasonography and X-ray findings.**

Laparoscopic findings Vs. ultrasonography	No. of patients.	Percentage
Same / Almost same	5	41.3%
Different	7	58.7%

In 7 out of 12 patients ultrasonography failed to diagnose (58.7%). In 5 patients (41.3%) ultrasonography findings were same / almost same as laparoscopic findings.

Laparotomy was not needed in any of the patient.

**Table 17. Laparoscopy as a diagnostic tool in non-acute abdominal conditions.**

Diagnosis	No. of patients	Percentage
SAIO due to bands / adhesions	3	25%
Koch's abdomen (ICT, mesenteric lymphadenopathy)	4	33.3%
Recurrent appendicitis	3	25%
NHL	1	8.3%.
Gall-bladder carcinoma	1	8.3%

(SAIO : Sub acute intestinal obstruction, ICT : ileocecal tuberculosis, NHL : Non-Hodgkin's lymphoma)

Diagnosis of Koch's abdomen was established as the cause in 4 out of 12 patients (33.3%). Recurrent appendicitis was established in 3 patients out of 12 patients (25%), intestinal bands/adhesions was

established in 3 patients out of 12 patients (25%), and 1 patient was diagnosed as NHL and other as Gall-bladder carcinoma.

**Table 18. Laparoscopy Results.**

Results	Number of patients	Percentage
False Positive	Nil	Nil
False Negative	Nil	Nil

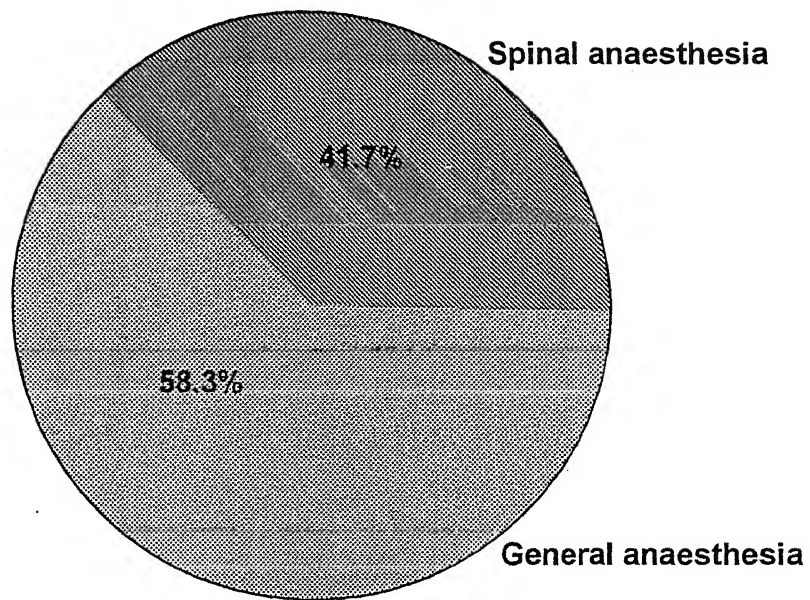
In all 12 patients no false positive or false negative results were seen.

*Outcome :* In all 12 patients (100%), non-acute abdominal condition diagnostic laparoscopy established the diagnosis clearly and saved delay in diagnosis, exhaustive investigations and patient sufferings while eliminating need for investigating the patient any further.

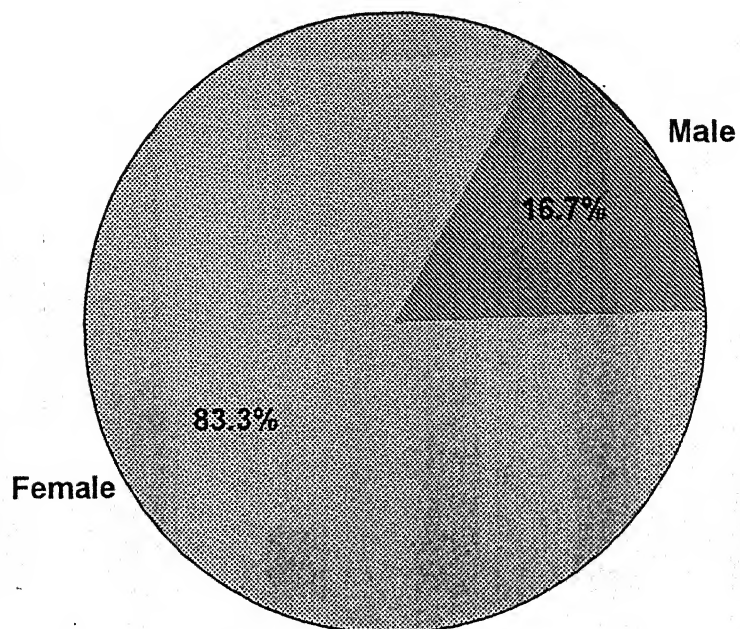
**Table 19. Final Results of Diagnostic laparoscopy in 12 patients.**

Total number of cases included in the study	12
Diagnosis established	12
Surgical exploration avoided	12
Complications associated with diagnostic laparoscopy	Nil
Mortality associated with diagnostic laparoscopy	Nil
Mean operative time	23 min.
Average post-operative hospital stay	3.3 days

Types of Anesthesia used in study group



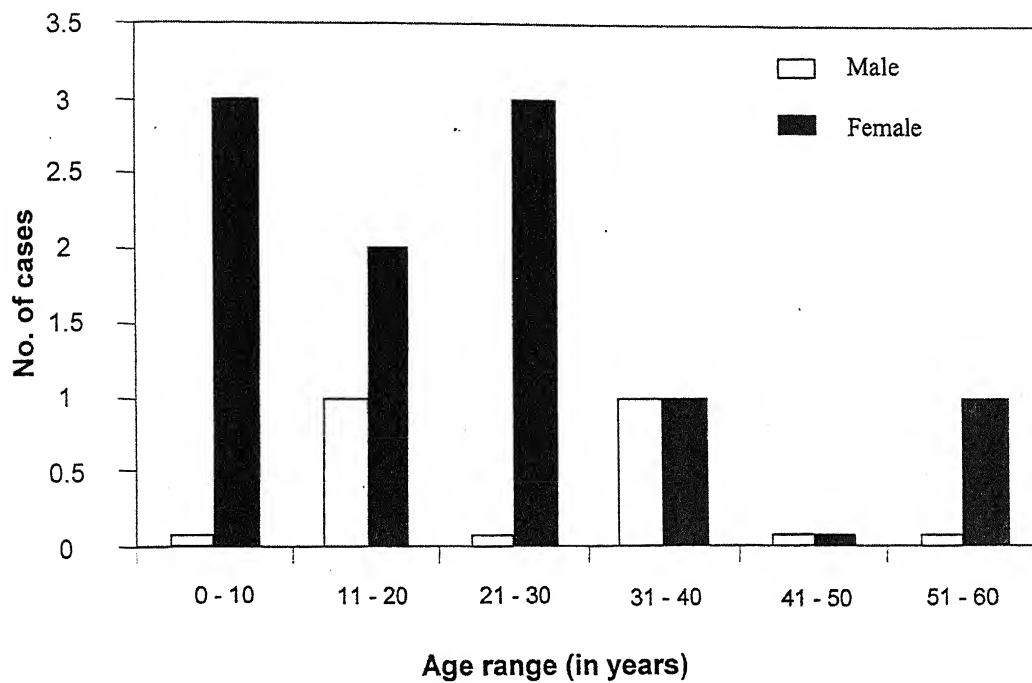
Male : Female ratio in the study group



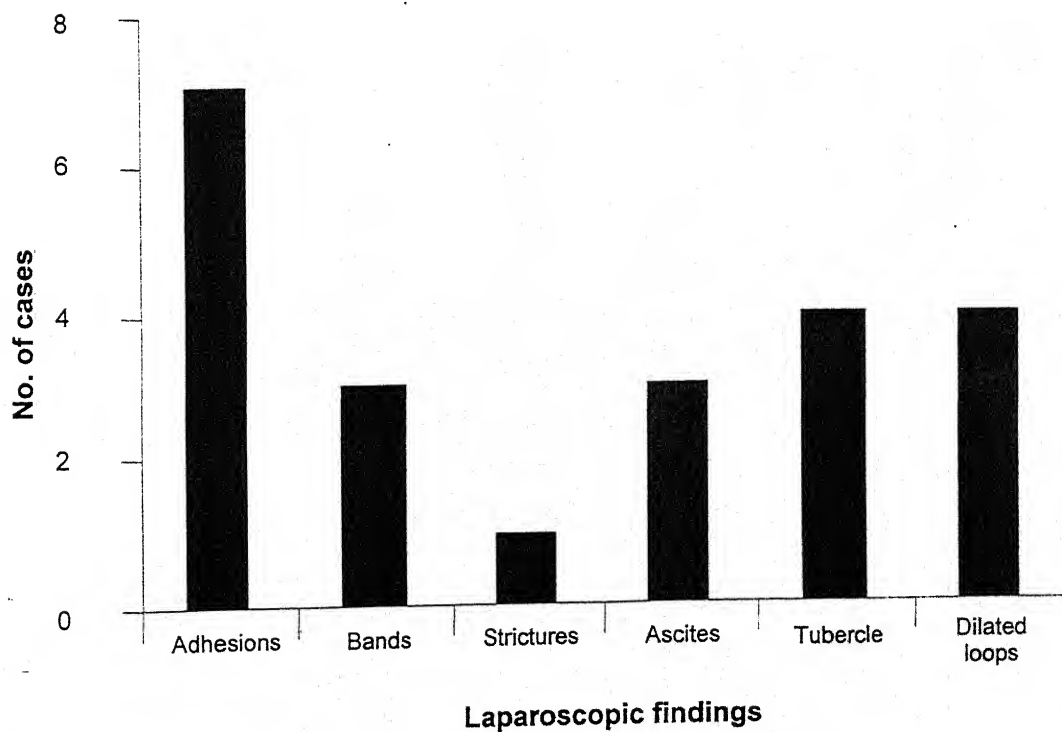


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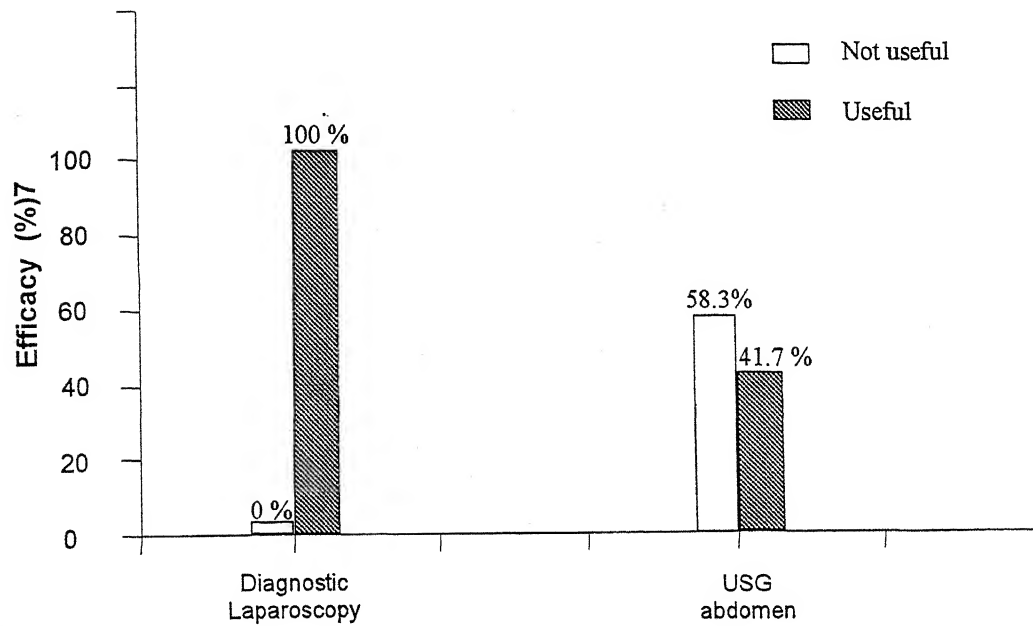
**Age & Sex distribution of patients undergoing diagnostic laparoscopy**



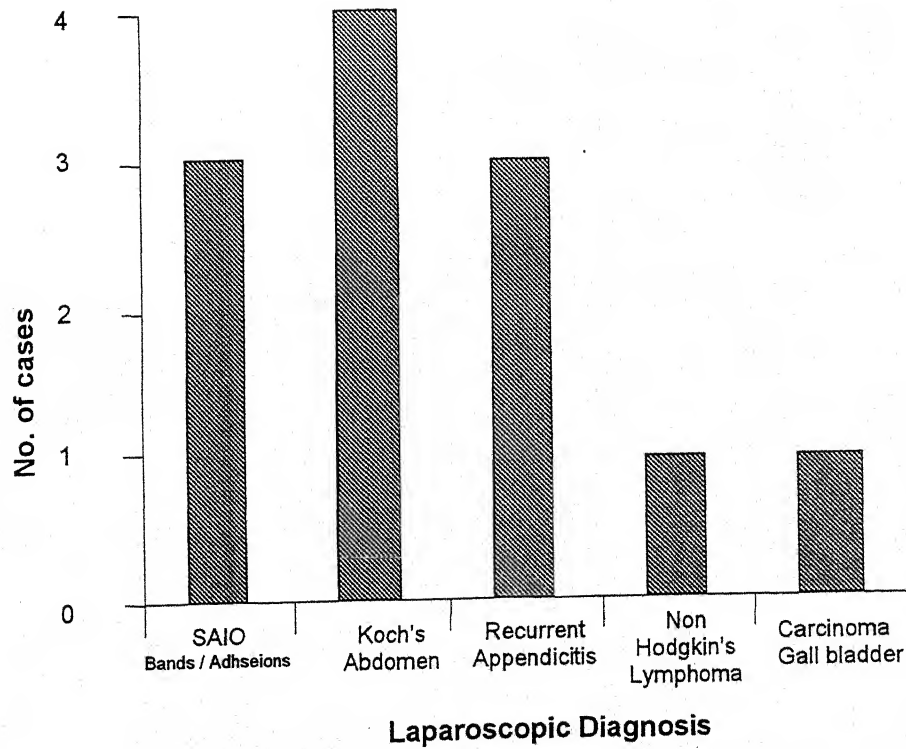
**Gross findings on diagnostic laparoscopy**



**Comparison efficacy of Diagnostic Laparoscopy to Ultrasound in study group**



**Distribution of Laparoscopic diagnosis in study group**





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# *Discussion*

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# Discussion

Diagnostic laparoscopy or peritoneoscopy is a good technique to establish the diagnosis in non-acute abdominal conditions. Laparoscopy provides a direct and better view of anatomy of intra-abdominal organs, lesser operative mortality and morbidity, a short hospital stay, acceptability to patient from the point of view of cosmesis and early return to work, all these qualities make laparoscopy superior to other routine scanning investigations. Due to these qualities and under vision biopsy, as well as therapeutic intervention like adhesiolysis all make laparoscopy also a good substitute to laparotomy, to establish the diagnosis in obscure intra-abdominal conditions. Further it can be converted to laparotomy if needed, at any stage of operation.

Patient with chronic or recurrent abdominal pain with or without a history of previous surgery, with or without intestinal obstruction symptoms are being given prolonged medical therapy without a clear-cut diagnosis. Ultrasonography and X-ray abdomen are usually inconclusive of diagnosis in these patients.

In our study twelve patients have undergone laparoscopy for non-acute abdominal conditions. The study included 12 patients of non-acute abdominal conditions. Of these twelve patients the age ranged from 6 – 60 years. Most of the patients occurred in the second and third decades of life (mean age of patient was 22.75 years).

Male : Female ratio was 1:5, there were 2 males (16.9%) and 10 females (83.3%) in the study group.

We carried out laparoscopic evaluation both under general anesthesia (7 patients, 58.3%) as well as under spinal anesthesia (5 patients, 41.7%). General anesthesia was the most preferred anesthesia in our study.

Laparoscopy established the diagnosis in all patients (100%). In three out of twelve patients (25%), SAIO due to Band and Adhesions

were noted. Adhesiolysis and bands removal was done during the same procedure. All three patients were available in the follow up of 2-10 months. In our study, out of three patients two patients (66.%) had no pain, and one patient (33%) had significant amelioration in their pain. Lavonius et al, found in their study of 46 patients of chronic abdominal conditions that adhesions were found in twenty nine patients (63.04%), adhesiolysis was carried out in twenty four patients (52.7%). Twenty one patients (89%) could be contacted for follow up during a mean time of nineteen months. Eighteen patients (77%) who had undergone adhesiolysis considered the results good or beneficial, no major complication were noted. He found laparoscopy to be a safe and useful procedure in the diagnosis of chronic abdominal conditions. Our study is in complete agreement with Lavonius study. In our study four out of twelve patients (33.3%) were diagnosed as Koch's Abdomen (ileocecal tuberculosis, mesenteric lymphadenopathy, adhesions), ATT was given to all four patients. All four patients were available in the follow up of 6 – 12 months, and found good response to antitubercular therapy.

A detailed study of role of laparoscopy in chronic abdominal conditions was done by Millar K et al. Their results are also similar to the present study. Only five out of fifty nine (8.5%) patients had no improvement in their pain in follow up. In rest of the cases laparoscopy was successful in diagnosis.

In another study done by Schistroma M et al, in forty one patients, laparoscopy was found to be an efficient tool for the evaluation of patient with chronic abdominal conditions and laparoscopic adhesiolysis cured or ameliorated chronic abdominal pain in more than 80% of the patients. Our study agrees with Schistroma's study. Conclusions are also similar of Custe Raza et al, Chao K et al, Wipfli – Funke A. et al and Yu Sy et al.

Malanghlin S et al, documented three diagnosed cases of abdominal tuberculosis over twelve months period. If patient present

with diffuse abdominal symptoms, the diagnosis of abdominal tuberculosis, should always be considered. Laparoscopy should replace diagnostic laparotomy as a definite diagnostic tool. Bauma BJ et al, reported that abdominal tuberculosis is often diagnosed in a late stage, because symptoms are aspecific. Two patients with intestinal tuberculosis and tuberculous peritonitis respectively, both from endemic countries presented with long standing fever, abdominal pain and weight loss. Acid fast bacilli were present in aspirate and biopsy specimens obtained by colonoscopy and laparoscopy respectively. PCR was positive for M.tuberculosis complex and later M.tuberculosis was cultured. Both patients responded to antitubercular therapy.

So, the conclusions of our study are similar to study of Bronstein JA et al, Malanghlin S. et al and Bauma BJ et al.

In our study three out of twelve patients of non-acute abdominal conditions (25%) were also diagnosed as recurrent appendicitis and one as non-Hodgkin lymphoma (8.3%) and another one as a Gall-bladder carcinoma (8.3%).

Ultrasound and X-ray abdomen can detect the cause of non-acute abdominal conditions. Many times, however, the presentation is non-specific and these scanning devices fail to diagnose. In our study USG diagnosed five out of twelve patients (41.7%). In rest of the patients USG was normal. Laparoscopy and histopathology of tissue material significantly confirms the diagnosis, as also suggested by Bronstein JA et al.

None of our patients needed laparotomy. We observed following advantages of laparoscopy over laparotomy.

1. Less tissue dissection and disruption of tissue planes.
2. Less post-operative pain.
3. Less post-operative ileus.
4. Less post-operative pulmonary complications.
5. Quick recovery.
6. Short hospital stay.

7. Less need of IV antibiotics.
8. Better visualization of paracolic gutters and pelvic cavity, which is not possible by diagnostic laparotomy.
9. Less peritoneal mesothelial cell ischemic damage from trauma, drying, talc, packs and delayed bleeding. So less chance of post-operative adhesions formation.
10. Better visualization and magnification of anatomy.
11. Excellent cosmesis and patient acceptability.

Although in comparison to ultrasonography and X-ray abdomen, laparoscopy is an invasive modality, but it can visualize the lesions of peritoneal and visceral surfaces even less than 1 cm. Biopsy can be taken under vision and after ascertaining the consistency of lesion. It can visualize adhesions. These advantages make it superior to ultrasonography and X-ray abdomen.

Laparoscopic examination was completed satisfactorily in all 12 patients. The median procedure time was 23 minutes. There was no morbidity and mortality instance in this series.

The results of our study are in confirmation with results as quoted in literatures (17,18,20,28,29,30). Studies involving more number of cases are needed in order to get a better statistical data.

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# *Conclusion*

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# Conclusion

This study was carried out, to evaluate the role of diagnostic laparoscopy in non-acute abdominal conditions.

Total twelve patients who underwent diagnostic laparoscopy in Department of Surgery, M.L.B. Medical College, Jhansi over a period of sixteen months were followed from first day of admission till the discharge from the hospital.

On completion of the study and analysis of the data obtained, following conclusions were derived :

1. All twelve patients who underwent laparoscopic examination for non-acute abdominal conditions, etiology conclusive diagnosis were established (100%).
2. In three out of twelve patients (25%), bands and adhesions were found to be the cause of non-acute abdominal pain. Adhesiolysis was done in the same setting.
3. In four patients, out of twelve patients (33.3%) Koch's abdomen was diagnosed.
4. In three out of twelve patients (25%), recurrent appendicitis was diagnosed.
5. Two patients out of twelve patients were diagnosed as Non-Hodgkin's lymphoma and other as Gall-bladder carcinoma.
6. The commonest symptom was pain in abdomen, which was found in eleven out of twelve patients (91.3%), followed by nausea, vomiting, loss of appetite (6 patients, 50%), paucity of flatus (6 patients, 50%), weight loss (5 patients, 41.7%), Mobile abdomen lump (4 patients, 33.3%), altered bowel habits (3 patients, 25%), distention of abdomen (3 patients, 25%).
7. On physical examination anaemia was found commonest (6 patients, 50%), followed by tenderness on P/A (5 patients, 41.7%), Ascites (2 patients, 16.7%), lymphadenopathy (2 patients, 16.7%), lump in



- abdomen (2 patients, 16.7%). In seven out of twelve patients per abdomen examination was within normal limits (56.3%).
8. All twelve patients underwent Ultrasonographic examination of abdomen (100%). In three out of twelve patients (25%) X-ray abdomen was also done.
  9. Ultrasonography was inconclusive of diagnosis in seven patients out of twelve patients (58.3%). In two patients out of twelve patients (16.7%) ultrasonography detected ascites. Distended bowel loops were reported in 3 patients (25%). X-ray abdomen supported the diagnosis of ultrasonography in one patient out of three, who underwent X-ray abdomen, rest two patients are normal.
  10. General anesthesia was used in seven out of twelve patients (58.3%). In five patients (41.7%) spinal anesthesia was used, so general anesthesia was the most preferred anesthesia.
  11. Adhesions were noted in seven patients out of twelve (58.3%). Three patients had bands and adhesions (25%). Four patients had tubercular adhesions (33.3%). In three out of twelve patients (25%) ascites was detected laparoscopically, while ultrasonography detected ascites in two patients (16.7%).
  12. Three out of twelve patients had bands around bowel. One patient had stricture and four patients had tubercles on peritoneal surface (33.3%).
  13. Two patients had lump. One patient had Gall-bladder carcinoma lump and another had ileocecal tuberculosis lump.
  14. Laparoscopic guided biopsies were taken in two patients (16.7%). In one patient biopsy was defined to FNAC, which was taken in one patient.
  15. Both laparoscopic guided biopsies were confirmatory (100%).
  16. No post-operative complications occurred in any of the patients studied.
  17. No operative mortality happened.

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18. No aggravation of pain complained by any of the patients after the procedure during the follow up.
  19. Mean operative time was 23 minutes.
  20. Average post-operative hospital stay was 3.3 days.
  21. Laparotomy was not needed in any of the patients.

In conclusion, diagnostic laparoscopy plays a prominent role in the diagnosis of non-acute abdominal conditions, than all other tests, under investigations. It is relatively quick to carry out and it can be performed with minimal morbidity, mortality and of course vision biopsy.

The limitations include cost, operation theatre time and delay in starting treatment. We believe that any of these disadvantages are offset by the avoidance of unnecessary laparotomy.

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# *Summary*

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# Summary

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Laparoscopy is a technique in which the peritoneal cavity and abdominal contents are examined using an endoscope inserted directly through abdominal wall. Laparoscopy provides a direct and better view of the anatomy of intra-abdominal organs, lesser operative mortality and morbidity, a short hospital stay, acceptability to patient from the point of view of cosmesis and early return to work, all these qualities make laparoscopy superior to ultrasonography, X-ray abdomen and exploratory laparotomy done for non-acute abdominal conditions.

The present study was carried out with the aims of :

1. To ascertain the role of laparoscopy as a diagnostic tool in non acute abdominal conditions in a developing country like India.
2. To compare the efficacy of laparoscopy in diagnosing non-acute abdominal conditions with other available non-invasive methods like USG, abdominal X-ray studies.
3. To obtain tissue for histopathological diagnosis and compare the accuracy of laparoscopy assisted biopsy with FNAC (blind or USG guided)

The present study has been undertaken at M.L.B. Medical College, Jhansi over a period of sixteen months. During this period, 12 cases of non-acute abdominal conditions were taken in the study (n=12) and on completion of the study and analysis of the data obtained, following conclusions were drawn :

1. All twelve patients who underwent laparoscopic examination for non-acute abdominal conditions, on examination showed that Koch's abdomen (33.3%) was the commonest cause, followed by adhesions and bands (25%), recurrent appendicitis (25%), Non-Hodgkin's lymphoma (one patient, 8.3%), Gall-bladder carcinoma (8.3%).

2. Male to female ratio was 1:5 , commonest age group was 20 – 40 years, youngest 6 years and oldest 60 years of age, mean age of patients 22.75 years.
3. The commonest symptom was pain in abdomen, which was found in eleven out of twelve patients (91.3%), followed by nausea, vomiting, loss of appetite (6 patients, 50%), paucity of flatus (6 patients, 50%), weight loss (5 patients, 41.7%), Mobile abdomen lump (4 patients, 33.3%), altered bowel habits (3 patients, 25%), distention of abdomen (3 patients, 25%).
4. Ultrasonography was inconclusive of diagnosis in seven patients out of twelve patients (58.3%). In two patients out of twelve patients (16.7%) ultrasonography detected ascites.
5. General anesthesia was used in seven out of twelve patients (58.3%). In five patients (41.7%) spinal anesthesia was used, so that general anesthesia was the most preferred anesthesia.
6. Adhesions were noted in seven patients out of twelve (58.3%). Three patients had bands and adhesions (25%). Four patients had tubercular adhesions (33.3%). In three out of twelve patients (25%) ascites was detected laparoscopically, while ultrasonography detected ascites in two patients (16.7%).
7. Three out of twelve patients had bands around bowel. One patient had stricture and four patients had tubercles on peritoneal surface (33.3%).
8. Laparoscopic guided biopsies were taken in two patients (16.7%). In one patient biopsy was defined to FNAC, which was taken in one patient. Both laparoscopic guided biopsies were confirmatory (100%).
9. No post-operative complications occurred in any of the patients studied.
10. No operative mortality happened.
11. Mean operative time was 23 minutes.

12. Average post-operative hospital stay was 3.3 days.
13. Laparotomy was not needed in any of the patients.

In last, diagnostic laparoscopy play a prominent role in the diagnosis of non-acute abdominal conditions, than all other tests, under investigations. It is relatively quick to carry out and it can be performed with minimal morbidity, mortality and of course vision biopsy. The limitations include cost, operation theatre time and delay in starting treatment. We believe that any of these disadvantages are offset by the avoidance of unnecessary laparotomy.

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# Master Chart of Diagnostic Laparoscopy

S.No	Name of patient	Age (yrs)	Sex	Anaesthesia	Date of Diagnostic laparoscopy	Special Investigations		Laparoscopic Findings							Compli-- cations	Total Operative time	Postoperative hospital stay (days)
						USG	X-ray Abdomen	Bands/ Adhesions	Ascites	Tubercles	Stricture	Mass lesion	Others	Lap Intervention			
1	Pragya Shukla	19	Female	S.A	27/07/02	Normal	Normal	a		+				B	No	38 Min.	2
2	Lovely	10	Female	G.A	8/10/02	Normal	Not done				+		Recurrent Appendicitis	C	No	15 Min	1
3	Farheen	6	Female	G.A	22/10/02	Normal	Not done	a, b						A	No	20 Min	7
4	Aneeta	14	Female	G.A	10/12/02	Normal	Not done	a, b						A	No	25 Min	3
5	Shyama Bihari	32	Female	S.A	22/12/02	Distended small bowel loops, rest within normal limits	Normal	a		+				A	No	20 Min	2
6	Mukesh	31	Male	G.A	21/01/03	Ascites, Hepatospleeno-megaly, Abdominal lymph nodes	Not done		+				Hepatospleenomegaly, Peritoneal nodules, Liver secondaries	B	No	30 Min	14
7	Mithia	60	Female	G.A	31/01/03	Gall bladder carcinoma	Not done		+				Liver secondaries, Gall-bladder carcinoma		No	25 Min	4
8	Jyoti	10	Female	G.A	12/3/03	Normal	Not done						Recurrent Appendicitis	C	No	12 Min	1
9	Himmat Singh	18	Male	S.A	17/04/03	Distended small bowel loops, rest within normal limits	Not done	a		+				A	No	35 Min	2
10	Rinku	22	Female	S.A	19/04/03	Normal	Not done	a, b						A	No	20 Min	1
11	Brij Kumari	21	Female	S.A	24/04/03	Normal	Not done						Recurrent Appendicitis	C	No	12 Min	1
12	Harkunwar	30	Female	G.A	25/05/03	Distended bowel loops, thickened bowel at ileocaecal region	Dilated Bowel loops	a	+	+		+		A	No	25 Min	2

B : Biopsy

A : Adhesiolysis/ Band removal

C: Appendicectomy

a : Adhesion

b : Bands